

DETAILED ACTION

1. In view of the amendment filed February 2, 2010, claim 18 has been cancelled. Claims 1-17, 19-30 are pending. Claims 2, 4, 22-25 are drawn to non-elected subject matter. Claims 1, 3, 5-17, 19-21, 26-30 are examined with merit.

2. In view of the amendment filed February 2, 2010, the rejection of claims 1, 3, 5-11, 13-16, 18-21, 26-30 under 35 U.S.C. 112, first paragraph, is withdrawn. Further, in view of the amendment filed February 2, 2010, the rejection of claims 1, 3, 5-11, 13-16, 18-21, 26-30 under 35 U.S.C. 102(b) as being anticipated by Hintze-Bruning et al. (US 6,297,314), is withdrawn. Further, the rejection of claims 12 under 35 U.S.C. 103(a) as being unpatentable over Hintze-Bruning et al. (US 6,297,314) in view of Roesler et al. (US 2003/0232942 A1), is withdrawn. The rejection of claims 17 under 35 U.S.C. 103(a) as being unpatentable over Hintze-Bruning et al. (US 6,297,314) in view of Gupta et al. (US 6,867,250), is withdrawn.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claims 1, 3, 5-11, 13-16, 18-21, 26-30 are rejected under 35 U.S.C. 102(b) as being anticipated by Singer et al. (US 6,013,733).

1. (Currently Amended) A coating composition comprising crosslinkable and crosslinking components, wherein said crosslinkable component comprises:

a copolymer having on an average 2 to 25 crosslinkable groups selected from the group consisting of hydroxyl, acetoacetoxy, carboxyl, primary amine, secondary amine, epoxy and a combination thereof; a weight average molecular weight ranging from about 1000 to 4500; a polydispersity ranging from about 1.05 to 2.5; wherein said copolymer is polymerized from a monomer mixture comprising one or more non-functional acrylate monomers and one or more functional methacrylate monomers provided with said crosslinkable groups; ~~and optionally one or both of: (i) up to 10% by weight of one or more functional acrylate monomers provided with said crosslinkable groups and (ii) up to 10% by weight of one or more non-functional methacrylate monomers;~~ wherein said functional methacrylate monomers are present in an effective amount for producing said copolymer having on an average 2 to 25 crosslinkable groups and having said weight average molecular weight; wherein said copolymer is produced by free radical polymerization of said monomer mixture at a polymerization temperature ranging from about 120°C to 300°C; and

wherein said crosslinking component for said crosslinkable groups is selected from the group consisting of polyisocyanate, polyamine, ketimine, melamine, epoxy, polyacid and a combination thereof; ~~and~~

wherein said monomer mixture includes 100% to 80% of the total amount of the non-functional acrylate monomers and the functional methacrylate monomers, percentage being in weight percentage based on the weight of the monomer mixture.

26. (Currently amended) A coating composition comprising crosslinkable and crosslinking components, wherein said crosslinkable component consists essentially of:

a copolymer having on an average 2 to 25 crosslinkable groups selected from the group consisting of hydroxyl, acetoacetoxyl, primary amine, secondary amine, and a combination thereof; a weight average molecular weight ranging from about 1000 to 4500; a polydispersity ranging from about 1.05 to 2.5; wherein said copolymer is polymerized from a monomer mixture consisting of one or more non-functional acrylate monomers and one or more

functional methacrylate monomers provided with said ~~functional crosslinkable~~ groups, and optionally one or both of: (i) ~~up to 0.01%~~ 0.01% to 10% by weight of one or more functional acrylate monomers ~~provided with said crosslinkable groups~~ and (ii) ~~up to 0.01%~~ 0.01% to 10% by weight of one or more non-functional methacrylate monomers, percentage being in weight percentage based on the total weight of the monomer mixture; and

wherein said crosslinking component for said crosslinkable groups is selected from the group consisting of polyisocyanate, ketimine, melamine, and a combination thereof.

Applicants' specification (page 7) provides the definitions and examples of functional acrylates and methacrylates, as well as the non-functional acrylates and methacrylates. The non-functional groups are selected from the group consisting of linear C₁ to C₂₀ alkyl, branched C₃ to C₂₀ alkyl, cyclic C₃ to C₂₀ alkyl, bicyclic or polycyclic C₅ to C₂₀ alkyl, aromatic with 2 to 3 rings, phenyl, C₁ to C₂₀ fluorocarbon and a combination thereof. The functional groups are selected from the group consisting of hydroxyl, carboxyl, acetoacetoxyl, primary and secondary amine, epoxy and a combination thereof.

Singer et al. (col. 18-23, Table 1-6, examples 1-13) disclose resin coating compositions meet the claimed composition requirements of "said monomer mixture

includes 100% to 80% of the total amount of the non-functional acrylate monomers and the functional methacrylate monomers, percentage being in weight percent based on the weight of the monomer mixture" of claim 1, or the claimed requirement of "0.01% to 10% by weight of one or more functional acrylate monomers provided with said crosslinkable groups and (ii) 0.01% to 10% by weight of one or more non-functional methacrylate monomers, percentage being in weight percentage based on the total weight of the monomer mixture" of claim 26.

Regarding the claimed "polymerization temperature ranging from about 120°C to 300°C", Singer et al. (col. 21, line 51) clearly teach the polymerization temperature of 130°C.

Regarding the claimed "polyisocyanate" of claim 3, Singer et al. (col. 4, line 23-24) clearly teach the use of crosslinking agents including diisocyanate. Singer et al. (col. 4, line 45-46; col. 5, line 55 to col. 6, line 8) disclose the use of polyisocyanates.

Regarding the claimed "epoxy" groups, Singer et al. (col. 8, line 9-26) clearly teach copolymers comprising 3.5 to 5.9 moles of epoxy groups.

TABLE 1-continued

Components	Examples 1-5				
	Parts by Weight				
	Example 1	Example 2	Example 3	Example 4	Example 5
<u>N,N-Dimethylacetoethyl methacrylate</u>	20.0	40.0	340.0	60.0	168.0
Hydroxyethyl acrylate	84.0	84.0	1176.0	—	—
2-Ethylhexyl acrylate	1896.0	1876.0	5684.0	1479.0	2232.0
Ethyl acrylate	—	—	—	479.0	—
<u>First initiator mixture</u>					
tert-Butyl peracetate (60% solution) ^a	25.0	25.0	87.5	—	—
Dicert-amyl peroxide	—	—	—	15.0	56.0
Xylene	125.0	125.0	437.5	180.0	168.0
<u>Second initiator mixture</u>					
tert-Butyl peracetate (50% solution) ^a	20.0	20.0	70.0	20.0	24.0
Xylene	30.0	30.0	105.0	30.0	24.0
<u>Resin properties</u>					
% Solids(110° C./1 hour)	99	97	99	99	97
Meq Amine	0.143	0.093	0.090	0.153	0.324
Hydroxyl Number	21.4	21.7	79.6	—	—
Weight average molecular weight	4529	5955	8423	23824	4349

^aAvailable as a 60% solution in odorless mineral spirits as Lupersol 555 M50 from Elf Atochem North America, Inc.

^aAvailable as a 50% solution in odorless mineral spirits from Elf Atochem North America, Inc.

TABLE 2

<u>Examples 6 and 7</u>		
Components	<u>Parts by Weight</u>	
	Example 6	Example 7
<u>Initial solvent charge</u>		
Isobutyl alcohol	72.4	72.4
Dowanol PM ¹	195.1	195.1
<u>Monomer mixture</u>		
Methacrylic acid	64.0	50.0
Hydroxyethyl acrylate	170.0	429.6
2-Ethylhexyl acrylate	1666.0	1530.0
Styrene	100.0	—
<u>First initiator mixture</u>		
V50 67 ²	60.0	60.0
Dowanol PM	180.0	180.0
<u>Second initiator mixture</u>		
tert-butyl peracetate (50% solution) ³	20.0	20.0
Dowanol PM	20.0	20.0
<u>Resin properties</u>		
% Solids (116° C./1 hour)	98	99

TABLE 2-continued

<u>Examples 6 and 7</u>		
Components	<u>Parts by Weight</u>	
	Example 6	Example 7
Acid Value	19.5	16.2
Hydroxyl Number	45.2	160.8
Weight average molecular weight	17418	10762

¹Propylene glycol methyl ether, available from Dow Chemical Company.

²2,2'-Azobis(2-methylbutyronitrile), available from E. I. duPont.

³Acrylates as a 50% solution in cel-sol[®] solvent spirits from Elf Atochem North America, Inc.

TABLE 3-continued

Examples 8 and 9 and Comparative Examples I and II

Components	Parts by Weight			
	Example 8	Example 9	Comp. Example I	Comp. Example II
Methacrylic acid	105.0	----	----	----
Acrylic acid	----	150.0	----	----
1-Ethylhexyl acrylate	1440.0	4410.0	750.0	1107.5
Ribyl acrylate	460.0	1490.0	250.0	350.0
Hydroxyethyl acrylate	----	----	----	67.5
<u>First initiator mixture</u>				
Di-tert-butyl peroxide	15.0	45.0	7.5	11.3
Xylene	190.0	540.0	105.0	135.0
<u>Second initiator mixture</u>				
tert-Butyl peracetate	20.0	60.0	10.0	15.0
(50% solution)				
Xylene	30.0	90.0	15.0	22.5
<u>Resin properties</u>				
% Solids	99	99	99	100
(110° C./1 hour)				
Acid Value	29.1	18.6	----	----
Hydroxyl Number	----	----	----	21.0
Weight average molecular weight	10254	15294	12895	25058

TABLE 4

<u>Step 1, Examples 10 and 11</u>		
Components	<u>Parts by Weight</u>	
	Example 10	Example 11
<u>Initial solvent charge</u>		
Xylene	332.5	332.5
<u>Monomer mixture</u>		
Glycidyl methacrylate	260.0	260.0
Hydroxyethyl acrylate	—	80.0
2-Ethylhexyl acrylate	1800.0	1720.0
<u>First initiator mixture</u>		
tert-Amyl peracetate (60% solution)	25.0	25.0
Xylene	125.0	125.0
<u>Second initiator mixture</u>		
tert-Butyl peracetate (50% solution)	20.0	20.0
Xylene	30.0	30.0
Temperature during second initiator addition	130° C.	reflux
Post-second initiator hold temperature	130° C.	reflux
<u>Resin properties</u>		
% Solids (130° C./1 hour)	82	81
Epoxy Equivalent Weight	1897.9	1832.3
Hydroxyl Number	—	50.1
Weight average molecular weight	5897	7064

TABLE 6-continued

Examples 12 and 13
 Two copolymers with various functionality were prepared in a manner
 similar to that of Example 1 from the components listed in Parts
 by Weight in Table 6.

Components	Example 12	Example 13
Xylene	525.2	50.0
Monomer mixture:		
N,N-Dimethylaminoethyl methacrylate	480.0	156.0
2-Ethylhexyl acrylate	2760.0	---
Isobutyl acrylate	2760.0	844.6
First initiator mixture		---
V50 67 ¹	90.0	
Toluene	120.0	15.0
Xylene	120.0	45.0
Second initiator mixture		45.0
V50 67 ¹	30.0	
Xylene	60.0	5.0
Resin properties		15.0
% Solids (110° C./1 hour)	99	
Meq Amine	0.440	98
Hydroxyl Number	0	0.89
Number average molecular weight	1837	app.1500 ²

¹ Available from DuPont.

² Approximate from results similar to Example 12

Regarding the claimed VOC feature of claim 7, according to the amount of solvents disclosed in the working examples in the tables above, the theoretical amount of the VOC based on the solvent contents clearly meet the VOC of 0"1 kg to 0.72kg" being claimed.

Regarding the claimed "tert-amine", Singer et al. (col. 27, line 35) disclose the use of methyl dicocoamine. Singer et al. (col. 12, line 55) also teach the use of tert-amine.

Regarding the claimed "coating" applications, Singer et al. (col. 15, line 62 to col. 17, line 23) clearly teach the application as a coating for the disclosed resin composition. Singer et al. (col. 16, line 1-5) disclose the use of pigments.

Regarding the claimed glass transition temperatures of the copolymers ranging "from about -10°C to 80 °C", Singer et al. (col. 14, line 22-24) teach that the disclosed acrylate copolymer can have glass transition temperature of less than 0°C.

In view of the substantially identical polymeric composition and substantially identical molecular weight properties (preferably 1000 to 15,000 g/mol.) (col. 14, line 25-28) being claimed and disclosed in Singer et al., and in view of the substantially identical polymerization method of using free radicals for the polymerization process, the examiner has a reasonable basis to believe that the claimed polydispersity of 1.05 to 2.5 is inherently possessed in Singer et al. Also, according to the above tables, Singer et al. clearly teach the molecular weight range being claimed.

In view of the substantially identical components for the polymeric composition of Singer et al. and as claimed which control the amount of functional group in the copolymers, the examiner has a reasonable basis to believe that the claimed "2 to 25 crosslinkable groups" are inherently possessed in Singer et al.

Regarding the claimed "gage pressure" of claim 21, applicants must recognize that "[E]ven though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. The patentability of a product does not depend on its method of production. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process." In re Thorpe, 777F.2d 695, 698, 227 USPQ 964, 966 (Fed. Cir. 1985).

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
 2. Ascertaining the differences between the prior art and the claims at issue.
 3. Resolving the level of ordinary skill in the pertinent art.
 4. Considering objective evidence present in the application indicating obviousness or nonobviousness.
6. Claims 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Singer et al. (US 6,013,733) in view of Roesler et al. (US 2003/0232942 A1).

Set forth from paragraph 4 of instant office action, the invention of claim 12 is very similar to the composition of claim 12.

The difference between the invention of claim 12 and Singer et al. is that Singer et al. are silent on a coating composition comprising isocyanatopropyl trimethoxy silane.

Roesler et al. (abstract; 0061) disclose polyurethane coating compositions that are very similar to the polyurethane coating compositions of Singer et al. in that both

disclose the use of polyols, and polyisocyanates for preparing polyurethane based coating compositions. In view that both Roesler et al. and Rink et al. are in the field of endeavors of developing novel polyurethane coating compositions, it would have been obvious to one of ordinary skill in art to incorporate the isocyanatopropyl trimethoxy silane teaching of Roesler et al. (page 5, 0067) into composition teachings in Singer et al. to obtain the invention of claim 12, motivated by the expectation of success of developing a coating system that is moisture curable (page 1, 0001; page 5, 0069-0074).

7. Claims 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over Singer et al. (US 6,013,733) in view of Gupta et al. (US 6,867,250).

Set forth from paragraph 4 of instant office action, the invention of claim 17 is very similar to the composition of claim 17.

The difference between the invention of claim 17 and Singer et al. is that Singer et al. are silent on a coating composition comprising aldimine.

However, Gupta et al. (col. 31, line 21-30) disclose the advantages of using latent reactive functionality (where block isocyanate are used) in a coating composition comprising polyurethane (col. 18, line 26-30).

The term "latent reactive" functionality within the meaning of the present invention and, as would clearly be understood by those persons of ordinary skill in the art, refers to reactive functionality which is blocked or masked to prevent premature reaction. As examples of a latent reactive functionality may be mentioned ketimines and aldimines (amines blocked, respectively, with ketones and aldehydes), amine-carboxylate salts; and blocked isocyanates such as alcohol (carbamates), oxime, and caprolactam blocked variations.

In view of the substantially identical endeavors of developing blocked isocyanate-containing based coating, it would have been obvious to one of ordinary skill in art to incorporate the aldimines teachings of Gupta et al. into Singer et al. to obtain the invention of claim 17.

Conclusion

8. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of

the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to William K. Cheung whose telephone number is (571) 272-1097. The examiner can normally be reached on Monday-Friday 9:00AM to 2:00PM; 4:00PM to 8:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David WU can be reached on (571) 272-1114. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov> you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

/William K Cheung/
Primary Examiner, Art Unit 1796

William K. Cheung, Ph. D.
Primary Examiner
April 6, 2010

